

American University of Beirut
Department of Computer Science
CMPS 251 - Numerical Analysis & Computing
Assignment 2 - MatLab



You should submit your answer in one file, named "your_name.m", containing all your codes

Exercise 1 Write a MatLab code "MyLUP.m" that, given a $n \times n$ matrix A , returns the LU -decomposition of A with partial pivoting
your code should returns L, U , and P

Exercise 2 Consider the data set S

$$\{(x_0, y_0), (x_1, y_1), \dots, (x_n, y_n)\}$$

- a) Write a MatLab function "MyNewton.m" that takes S as input, and returns the divided difference table
- b) Test your program for

x	$-\pi$	$-\frac{\pi}{2}$	0	$+\frac{\pi}{2}$	$+\pi$
$f(x)$	-1	0	1	0	-1

- c) Plot the resulting polynomial together with the true function $\cos x$ over $[-\pi, +\pi]$
(you may find the MatLab commands " $x = -\pi:0.01:\pi$ " then " $\text{plot}(x, \cos(x))$ " useful to visualize the cosine function, and with little effort plot also the polynomial)

Exercise 3 write a Matlab code "[z, M]=MySpline.m" that takes as input a set of data

$$\{(t_0, y_0), (t_1, y_1), \dots, (t_n, y_n)\}$$

and returns the value of the vector z , and a matrix M whose entries are the coefficients of $S_i(x)$